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Conference Abstract

Spatiotemporal and Environmental Completeness of eBird Data in Taiwan

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Abstract

Recent developments in citizen science have significantly enhanced the public availability of biodiversity data (Chandler et al. 2017, Kelling et al. 2019). Associated open data platforms, such as eBird, have become the major data source supporting scientific research and biodiversity conservation (Tsai et al. 2021, Meehan et al. 2022, Walker and Taylor 2017). However, the increasing availabililty of data does not resolve, but rather exacerbates, data bias issues (Escribano et al. 2019, La Sorte and Somveille 2020, Troia and McManamay 2016). While over 11.2 million bird observation records from Taiwan, including historical data spanning 40 years, are currently available on the eBird platform, their usefulness for characterizing the spatiotemporal patterns of bird communities remains unclear. To address this gap, we evaluated the data's completeness in representing species richness across spatial and temporal scales and examined the representativeness of the data along several environmental gradients. Using the iNEXT package in R, we found an increase in data completeness with increasing spatial scales Fig. 1, with the mean proportion of bird species represented being increased from 14.0% at the 1 km scale to 68.0 and 82.9% at the 5 and 10 km scales, respectively, across Taiwan. We also found an exponential improvement of data completeness over time. At the 5 km scale, the represented species proportion increased from 6.78 and 32.14% in the 1980s and 1990s to 36.86 and 63.56% in the 2000s and 2010s Fig. 2, with the data in the last decade alone achieving similar completeness to the entire four-decade data. We also found that the areas with good data completeness (i.e., over 80%) adequately represented the full gradient of annual precipitation across Taiwan, but showed a bias toward areas at lower

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elevations and with lower forest coverage. These results indicate overall good data completeness of the eBird dataset for representing bird species richness in Taiwan. However, this study also highlights some data gaps, especially at finer scales, which need attention when using the dataset. This information is crucial for shaping future research designs and survey plans, aiming to enhance the applications of biodiversity data.

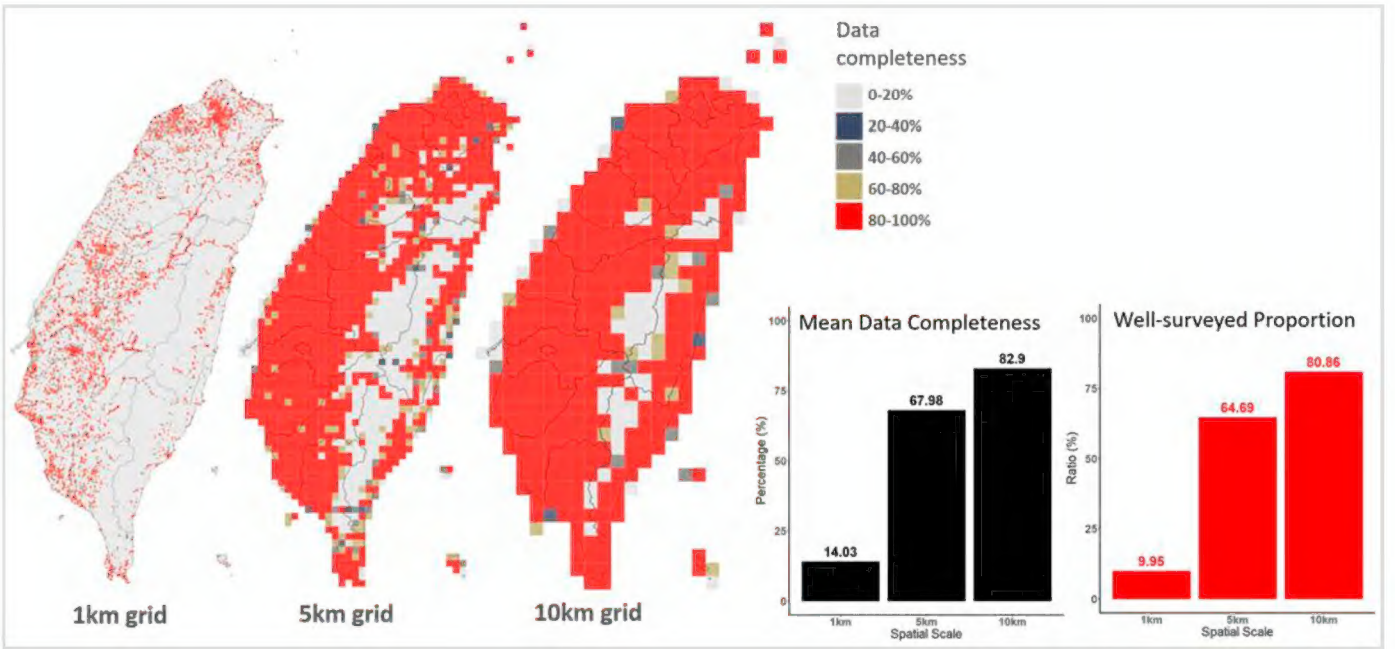

Figure 1.

Variations in eBird data completeness at different spatial resolutions in Taiwan.

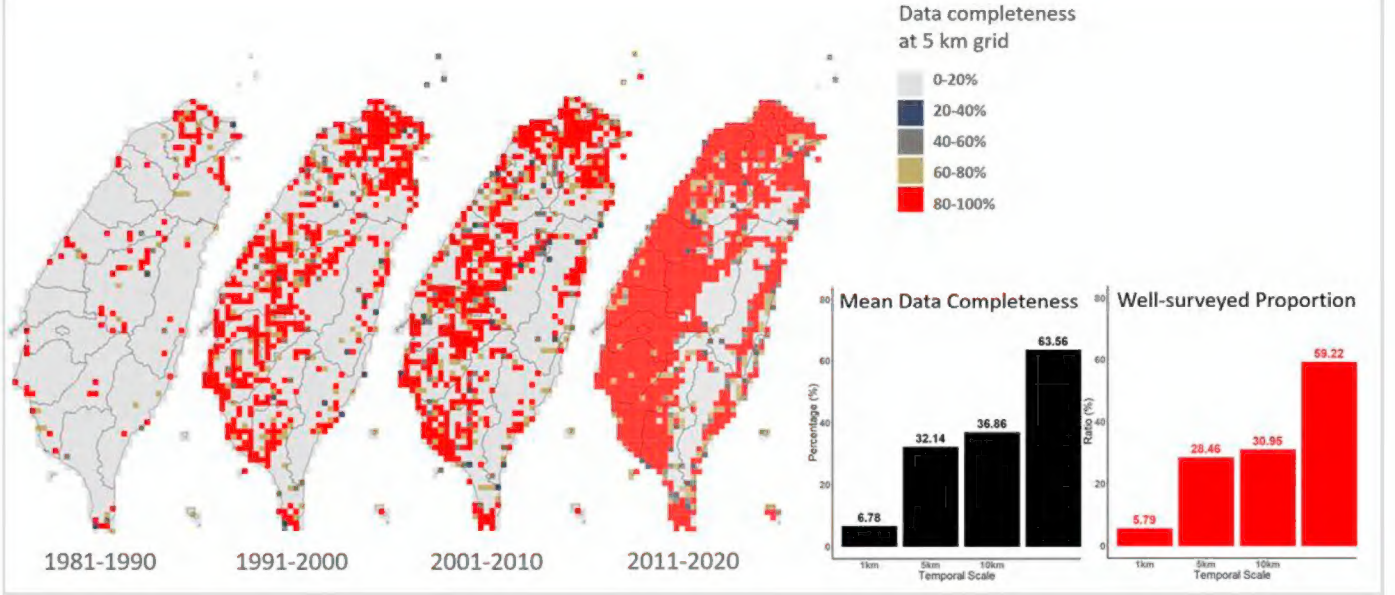

Figure 2.

Changes in eBird data completeness at a 5km x 5km resolution across Taiwan from 1981 to 2020.

Keywords

citizen science, data gaps, iNEXT, open data, survey completeness

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Conflicts of interest

The authors have declared that no competing interests exist.

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